Leaf Area Index (LAI) & Fraction of Photosynthetically Active Radiation (FPAR) – Moderate Resolution

Product Description

This Level 4 product includes two parameters, Leaf Area Index (LAI, Parameter 2680) and Fraction Photosynthetically Active Radiation (FPAR, Parameter 5367) which will be retrieved at 500 m spatial resolution and composited to 1 km on the 8-day compositing period. LAI defines an important structural property of a plant canopy which is the number of equivalent layers of leaves relative to a unit ground area. FPAR measures the proportion of available radiation in the photosynthetically active wavelengths (0.4 to 0.7 μm) that a canopy absorbs. The LAI product will be an LAI value between zero and 12 of the global gridded database at the corresponding MVI compositing interval. The FPAR product will be an FPAR value between 0.0 and 1.0 assigned to each 1-km cell of the global gridded database at the corresponding MVI compositing interval.

Research & Applications

LAI and FPAR are biophysical variables which describe canopy structure and are related to functional process rates of energy and mass exchange. Both have been related directly to the NDVI from AVHRR by theoretical canopy modeling and field studies. Both LAI and FPAR have been used extensively as satellite derived parameters for calculation of surface photosynthesis, evapotranspiration, and NPP. These products are essential in calculating terrestrial energy, carbon, water cycle processes, and biogeochemistry of vegetation. The LAI product is an input to Biome-BGC (Biogeochemical) models to produce conversion efficiency coefficients which are combined with the FPAR product to produce daily terrestrial PSN (photosynthesis) and annual NPP.

Data Set Evolution

This product is derived directly from the modified vegetation index (MVI) and ancillary information on surface characteristics such as land cover type and background. The algorithm combines these parameters using a 3-D radiative transfer model to produce LAI and FPAR values which are stored in a look-up table. This approach places the computationally intensive load in a preprocessing phase and minimizes the routine load on the PGS.

Suggested Reading

Asrar, G., *et al.*, 1992.

Nemani, R.R., *et al.*, 1993a.

Running, S.W., *et al.*, 1994.

Sellers, P.J., 1987.

MOD 15
PRODUCT SUMMARY

Coverage:
global

Spatial/Temporal Characteristics:
1-km/8-day composite

Key Science Applications:
biogeochemical cycle modeling, NPP estimation

Key Geophysical Parameters:
leaf area index, fraction photosynthetically absorbed radiation

Processing Level:
4

Product Type:
standard, at-launch

Science Team Contact:
S.W. Running

Leaf Area Index (LAI) and Fraction of Photosynthetically Active Radiation (FPAR) – Moderate Resolution

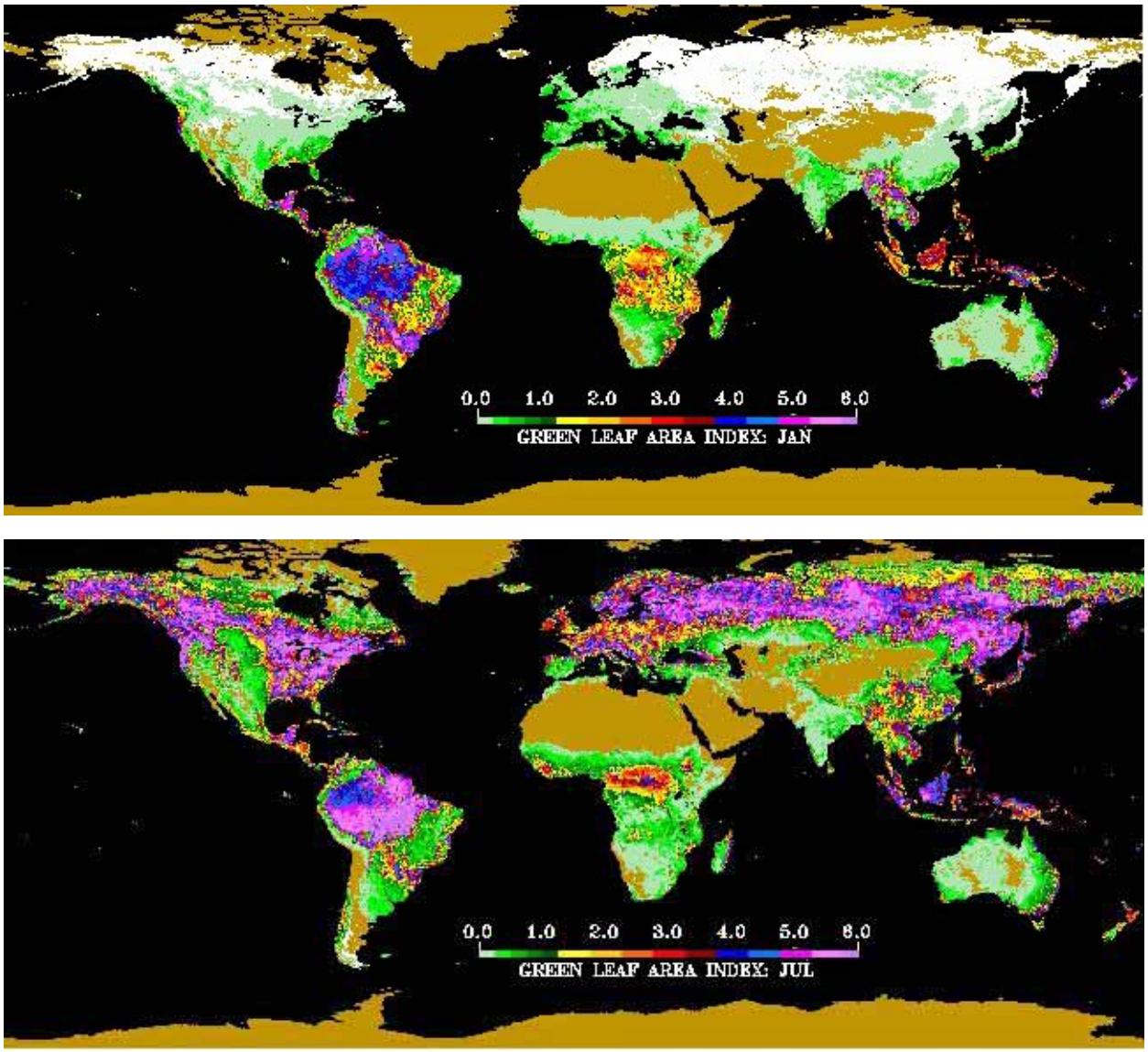

Figure 34. **Global Leaf Area Index Estimated with the NDVI-LAI Relationships Derived from the Radiative Transfer Model and Applied to the Advanced Very High Resolution Radiometer (AVHRR) Pathfinder NDVI Data Set.** Biome-specific relations were applied to the 10-day composite NDVI data and the resulting LAI values were averaged to obtain monthly LAI. The top image is the color-coded LAI in January obtained by further averaging over the 9-year period of record. Similarly, the bottom image shows the global LAI distribution during the month of July. Areas colored white denote either missing data (terminator effect) or where the algorithm failed.